

## ABSTRACT OF THE DISCLOSURE

Methods and apparatus for measuring the distribution of cluster ion sizes in a gas cluster ion beam (GCIB) and for determining the mass distribution and mass flow of cluster ions in a GCIB processing system without necessitating the rejection of a portion of the beam through magnetic or electrostatic mass analysis. The invention uses time-of-flight measurement to estimate or monitor cluster ion size distribution either before or during processing of a workpiece. The measured information is displayed and incorporated in automated control of a GCIB processing system.

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